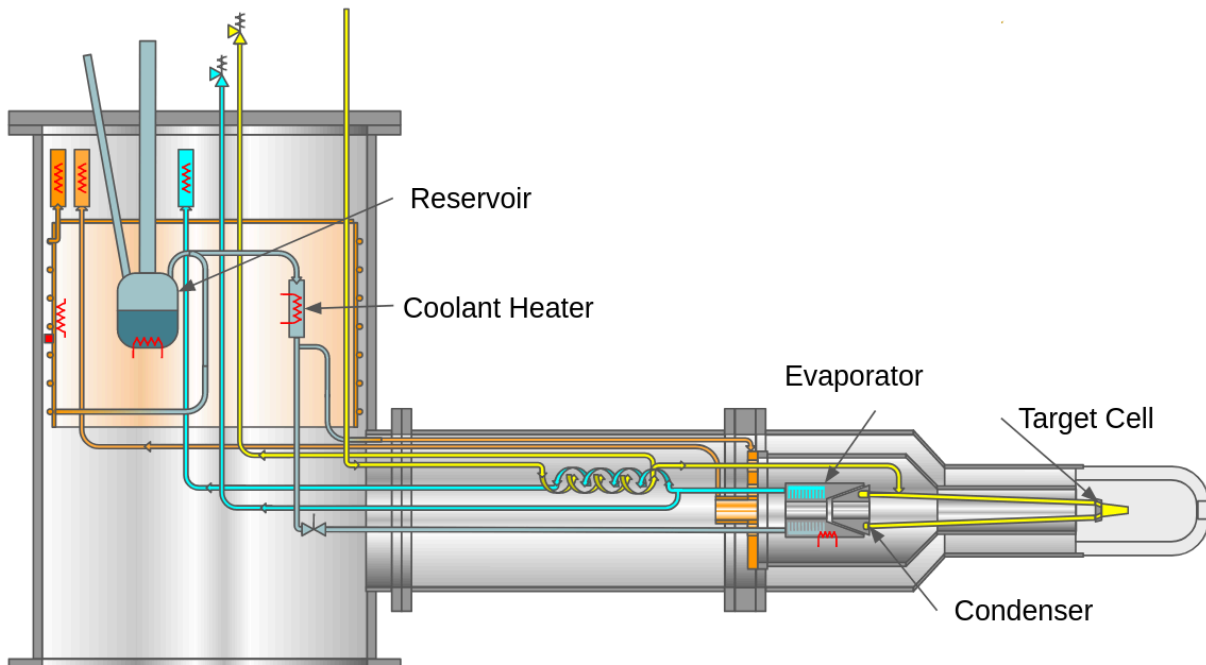


Hall B Cryotarget Controls Manual

System Overview

The Hall B Cryotarget uses liquid helium from the end station refrigerator as a coolant to liquify gasses (H_2 , D_2 , 4He , or 3He), filling a kapton target cell within the CLAS12 interaction region. The system consists of two primary, completely separated gas loops. The coolant loop (in blue in the figure) delivers 4 K gas boil-off from the liquid Helium reservoir through a heater to the evaporator, which is held at the desired temperature to liquify the target gas. The coolant loop also cools heat shields around the reservoir and target, and it vents back to the end station refrigerator through three exhaust paths. The target gas loop (in yellow in the figure) carries gas from the gas panel to liquify in the target condenser, which is thermally coupled to the evaporator of the coolant loop. From the condenser, the target liquid leads to the target cell.



Operator Controls

The target control GUI is a frontend written in CSS Phoebus to control and monitor the target's EPICS PVs. The GUI is available to open from the Hall B EPICS menu.

A shift worker will operate only two controls on the main panel during normal operation, the target status and the solid target flags. The large target status buttons at top left allow the changing of state of the liquid target. Selecting one of these choices changes the exhaust flows, heaters and alarm values to set the target for the desired state. To fill the target with liquid, select the "Fill Cell" state, and to empty it, select "Empty Cell." Once "Empty Cell" is selected,

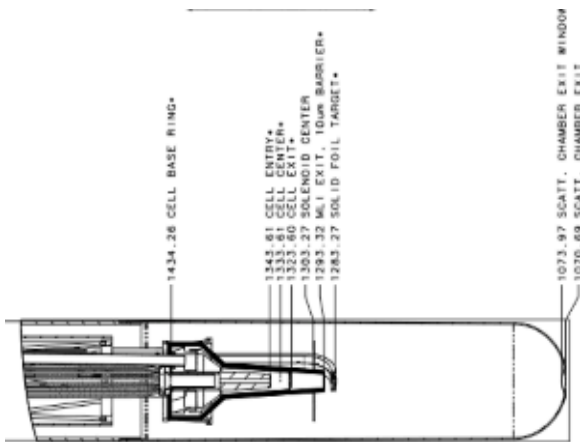
the Cell status will change to “Emptying” until the cell is empty, when it will change to “Empty.” Likewise, when “Fill Cell” is selected, the Cell Status will change to “Filling” until the cell is “Full.” The beam may only be sent to the target when in “Empty” or “Full.”

Hall B Cryotarget

Solid Target:

Cell Status:

Shown below are the RG-E solid foils and cryo-target assembly, along with various Al foils mounted in the beamline, characteristics, and positions.

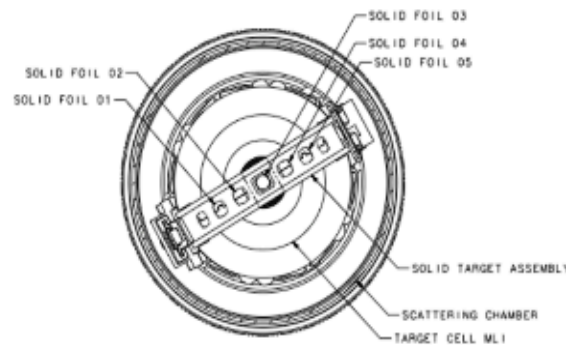


Hall to CLAS12 coordinates conversion:
 $1273.27 - z_{\text{hall}} = z_{\text{CLAS12}}$ mm

TABLE -B-
MATERIALS IN THE BEAM LINE 2CM TARGET CELL CONFIGURATION

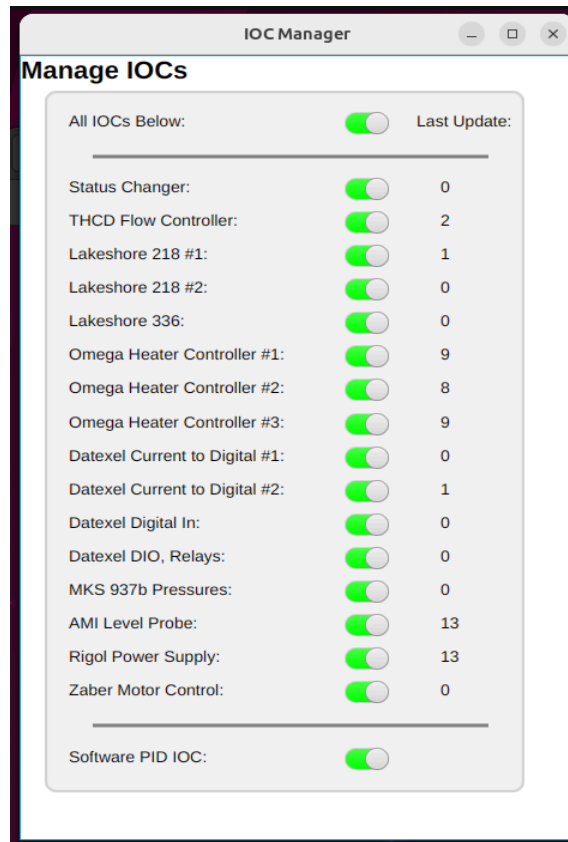
ITEM	DRAWING NO.	MATERIAL	THICKNESS
TARGET CELL ENTRY		ALUMINUM	15um
TARGET CELL EXIT	B02301-03-01-0100	ALUMINUM	15um
SOLID FOIL 01	TBD	CARBON	1480 um
SOLID FOIL 02	TBD	ALUMINUM	1200 um
SOLID FOIL 03	TBD	COPPER	360 um
SOLID FOIL 04	TBD	TIN	300 um
SOLID FOIL 05	TBD	LEAD	140 um
SCATTERING CHAMBER EXIT	B00000-03-01-0300	ALUMINUM	75um
VACUUM VOL. ENTRY (DOWNSTREAM)	B00000-02-07-0210	ALUMINUM	75um

NOTE: WHEN AT OPERATING TEMPERATURE, CELL AND FOIL LOCATIONS DESIGNATED WITH ** MOVE UPSTREAM APPROXIMATELY 5mm DUE TO THERMAL CONTRACTION.



When first starting the IOCs, or in the event of an IOC failure, it may be necessary to operate the IOC manager panel. This is accessed using a button at the bottom left. The IOC manager panel allows the starting and stopping of any individual IOCs that run the target. The

manager shows the status of each IOC, with an update counter showing the last time that the IOC updated a value.



Emergency Operation

In case of emergency, there are two modes that can be selected: "Standby" and "Safe." In Standby, the flows are lowered so that the helium reservoir and cell empty. If Safe mode is selected, an expert must recover the system. In Safe, the flows are closed so the entire system warms up. These may be accessed from the target expert panel:

